J. Glob. Innov. Agric. Soc. Sci., 2014, 2(1): 28-30.
ISSN (Online): 2311-3839
DOI: 10.17957/JGIASS/2.1.451
http://www.jgiass.com

IRON STATUS AND HAEMATOLOGICAL PROFILE OF LACTATING AND NON-LACTATING BUFFALOES

Fatima Shahzadi[1], Razia Iqbal[1], Tahir Aziz[2], Rukhshanda Saleem[1] and Muhammad Nadeem Abbas[1,*]

[1]Department of Zoology, University of Gujrat, Hafiz Hayat Campus, Gujrat
[2]Poultry Research Institute Rawalpindi, livestock and dairy department Punjab
[*]Corresponding author's e-mail: abbasmndr@gmail.com

The serum iron concentration and hematological parameters were assessed of lactating and non-lactating Nili-Ravi buffaloes (*Bubalus bubalis*). A total of four dairy farms were visited in Gujrat district to collect blood samples from the buffaloes and the samples were analyzed for hematological parameters and serum iron concentration. Haemoglobin, white blood cell, red blood cells, lymphocyte, hematocrit and iron concentration were recorded higher in lactating buffaloes, while mean corpuscular volume, corpuscular Hemoglobin, corpuscular Hemoglobin Concentrations and platelets were found least in non lactating buffaloes. Furthermore all the hematological parameters and iron concentration were found significantly ($P<0.05$) different between lactating and non-lactating buffaloes.
Keywords: Blood, Serum, Heifer, Minerals, livestock

INTRODUCTION

Livestock is a growing business in Pakistan and Government is striving to promote this business. It provides milk, meat and leather etc, to rapidly growing human population. Yet progress is too slow compared to geometrical increase of population. Among livestock buffaloes are good dairy animal which produce almost 28694 liters milk out of total 46440 liters of milk produced in the country (Anonymous, 2011; Saleem *et al.,* 2014). Nili-Ravi and Kundi are best breeds present in Pakistan, moreover, Nili-Ravi is the highest milk producing buffalo and maximum concentration is in Punjab.

In farm animals including Nili-Ravi both macro and micro minerals play an imperative role in production and reproduction (Corah, 1996). A blood mineral content in buffaloes and cows varies at different levels like species and area as well as depends upon the level of minerals in fodder (Bedi and Khan, 1984; McDowell and Arthington, 2005; Abbas *et al*., 2012; Abbas *et al*., 2013). In forages, iron concentration is highly variable but mainly forages contain from 70 to 500 mg Fe/kg. This difference in forage iron mainly due to its concentration in soil. Water intake also can be important sources of iron for beef cattle. Accessibility of iron from forages appears to be lower than from supplemental iron sources (Thompson and Raven, 1959).

Trace minerals deficiency cause harmful effect on growth and reproduction rate of animals. Sometimes, imbalance of minerals takes place rather than mineral deficiency (Grace, 1983). The requirement of trace minerals depends upon: Animal species, sex, stages of growth and reproduction (Henderson, 1990). Iron is a vital constituent in the proteins structures that is involved in the transportation and consumption of oxygen. Furthermore, many other trace minerals, several enzymes also contain iron or activated by iron (Beard, 2001; Arthington, 2002; Nathan *et al.*, 2003, Gibson, 2005; Shabir *et al.*, 2014). The signs of iron deficiency in animals may include: anemia, anorexia, reduced growth rate, or increased rate of weight loss, reduced immune response, laziness, Pale mucous membranes, Atrophy of the papillae of the tongue. (Arthington, 2002). The present study is aimed to estimate the level of iron and blood parameters in lactating and non-lactating buffaloes.

MATERIALS AND METHODS

The present study was conducted to estimate iron deficiency and blood profile in heifers and milch buffaloes (Nili-Ravi buffaloes (*bubalus bubalis*)) of District Gujrat (32.5833° N, 73.7500° E), Punjab, Pakistan. The main source of irrigation in this region is Chenab River which flow through the District.

Four livestock farms were selected for collection of blood samples. A total 40 blood samples were collected from lactating (n= 20) and heifers (n= 20) buffaloes from four livestock farms and 10 samples from each farm. 10 ml blood sample was taken from jugular vein of both lactating and heifers buffaloes using 20cc syringe. Of which 3ml of blood sample was preserved in tubes containing EDTA (anticoagulant) for biochemical analyses and 4ml of blood was kept in tubes prefilled with gel for serum separation. The latter blood samples (4 ml) were centrifuged at 4000 rpm for 5 min. to collect plasma within 24 hours after the collection of samples. The plasma samples were labeled and stored in centrifuged tubes at -4 ^{0}C in refrigerator (Made in China) till further analysis. Wet digestion of plasma was done, as described by Richard (1968). Iron was estimated by using Spectrophotometer (Perkin Elmer AA400). The concentrations of each sample were recorded with the help

Table 1: Comparison of Hematological Parameters and serium iron concentration between Lactating and Non-lactating Buffaloes (n= 40)

Hematological Parameters	Lactating Buffaloes			Non-Lactating Buffaloes			*t-value*	*p-value*
	Min.	Max.	Mean±SE	Min.	Max.	Mean±SE		
HGB (g/dL)	5.5	12.3	9.94±0.47	8.4	13.4	11.29±0.34	-2.12	0.040***
WBCs ($\times10^3$/µL)	4.72	17.16	8.32±0.78	7.72	15.43	11.06±0.58	-3.12	0.000***
RBCs ($\times10^3$/µL)	2.23	6.84	5.38±0.25	3.7	10.87	6.69±0.39	-2.26	0.030**
LYM (%)	1.68	6.43	2.97±0.27	1.7	10.57	5.43±0.60	-3.89	0.000***
HCT (%)	16.14	36.9	27.17±1.27	23.91	40.67	31.10±1.04	-2.12	0.040**
MCV (fL)	31	72	51.75±2.08	37	54	45.85±1.09	2.11	0.040**
MCH (pg)	12.1	24.9	19.85±0.63	11.5	25.9	17.87±0.65	2.14	0.040**
MCHC (g/dL)	33.3	40.4	37.85±0.45	30.5	41.5	35.94±0.67	2.25	0.030**
PLT($\times10^3$/µL)	5	497	237.9±31.76	25	455	171.15±25.91	2.20	0.030**
Iron Concentration	1.44	3.19	1.88±0.10	1.46	4.55	2.38±0.15	-2.32	0.030**

Note: HGB = Haemoglobin, WBCs = white blood cell, RBCs = red blood cells, LYM = lymphocyte, HCT = Hematocrit, MCV = Mean corpuscular volume, MCH = Mean corpuscular Hemoglobin, MCHC = Mean corpuscular Hemoglobin Concentration and PLT = Platelets

of regression equation (Akhtar *et al.*, 2011). Abacus automatic hematological analyzer (Abacus Junior model No. 2009) was used to measure complete blood count on the same day of sample collection. 4ml of blood was kept in tubes containing gel.

Data obtained were analyzed by using PAST Statistical Software and Microsoft Excel sheet 2010. To determine the significance among lactating and non-lactating buffaloes Paired t- test was applied on data at 0.05% level of significance.

RESULTS AND DISCUSSION

The present study was aimed to highlight variation of blood parameters and iron concentration in lactating and non-lactating buffaloes. Iron plays a pivotal role in living animals as it is an essential component of protein structure (e.g. Hemoglobin, Myoglobin and cytochromes). Moreover, many other trace minerals and variety of enzymes also constitute iron (Arthington, 2002). Iron is essential mineral attained from diet and engaged in superior gastrointestinal tract (GI) (NRC, 1985).

The table 1 shows (Mean ±S.E) values of blood parameters and iron concentration in lactating and non-lactating buffaloes studied in dairy farms at District Gujrat. Among haematological parameters HGB, WBC, LYM and HCT had higher values in non-lactating buffaloes (11.29±0.34g/dL, 11.06±0.58×10^3/µL, 6.69±0.39×10^3/µL, 5.43±0.60%, 31.10±1.04% respectively) compared to lactating buffaloes (9.94±0.47 g/dL, 8.32±0.78×10^3/µL, 5.38±0.25×10^3/µL, 2.97±0.27%, 27.17±1.27% respectively). Whereas MCV, MCH, MCHC and PLT were recorded least in non-lactating than lactating Buffaloes. However, all the hematological parameters were found significantly different (P<0.05) in lactating and non-lactating buffaloes. Similar work was conducted by Ciaramella *et al.* (2005), they determined that heifer buffaloes have higher values of different blood parameters (PCV) compared to old buffaloes and lower values of mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC).

Minerals play imperative role from early stages in life of both human beings and livestock. Before recorded history, common salt was traded to satisfy the salt cravings of grazing animals. Under nutrition is generally accepted as one of the most important limitation of livestock (e.g. buffaloes) production in tropical countries. Moreover, the lack of protein and sufficient energy is mainly responsible for sub-optimum livestock production (McDowell *et al.*, 1983). Yet the iron is associated with metabolic and hematological characters (Ganong, 1967). The results of present study indicated that iron concentration was much higher in non-lactating (2.38 ± 0.15) compared to lactating (1.88 ± 0.10) buffaloes. Moreover the mean concentration of serum iron was significantly different (P<0.05) between lactating and non-lactating buffaloes (Table 1). Previously similar work was conducted by Akhtar *et al.* (2011), they determined the status of trace minerals in Nili-Ravi buffaloes of District Kasur. They found the concentration of serum iron was considerably higher in calves compared to lactating buffaloes. Similar findings were reported by Yadav *et al.* (1998) and Samanta and Samanta (2002). They reported that the serum iron level in animals of different physiological status ranged from 1.44 ± 0.32 to 2.93 ± 0.56 ppm. In Iran Noaman (2013) determined the concentration of serum iron of dairy cattle and found the concentration of iron in serum (2.82±0.12 µg/ml) in blood samples.

CONCLUSION

Both lactating and non-lactating buffaloes were found iron deficient, and lactating buffaloes require more mineral contents compared to non-lactating buffaloes. Moreover the physiological status of buffaloes is determines by the level of minerals and blood profile. To overcome this critical problem in buffaloes is compensated by proper iron supplements such as ferrous sulfate, ferrous carbonate and ferric oxide.

REFERENCES

Abbas, M.N., S.A. Rana, M. Mahmood-Ul-Hassan, N. Rana and M. Iqbal. 2013. Phytochemical constituents of weeds: baseline study in mixed crop zone agroecosystem. Pak. J. Weed Sci. Res. 19: 231-238.

Abbas, M.N., S.A. Rana, M. Shahid, N. Rana, M. Mahmood-ul-Hassan and M. Hussain. 2012. Chemical

evaluation of weed seeds mixed with Wheat grains at harvest. J. anim. plant sci. 22: 283-288.

Akhtar, S.M., A.A. Farooq, M.M. Ayaz, M.M. Hussain, M.H. Lashari and Z.I. Chaudhary. 2011. Trace Mineral Status of Nili-Ravi Buffaloes in Tehsil Pattoki of District Kasur, Pakistan. Vet. Sci. 2: 2249-7366.

Anonymous. 2011. Economic Survey, Government of Pakistan, Islamabad.

Arthington, J.D. 2002. Essential Trace Minerals for Grazing Cattle in Florida. AN086. Animal Science Department, University of Florida.

Beard, J.L. 2001. Iron biology in immune function, muscle metabolism and neuronal functioning. J. Nutr. 131: 568-580.

Bedi, S.P.S. and S.A.Khan. 1984. Trace element status of soil, fodder and animals in Bijnore district of Uttar Pradesh. Indian J. Anim. Sci. 54: 570-574.

Ciaramella P., M. Corona , R. Ambrosio, F. Consalvo, A. Persechino. 2005. Haematological profile on non-lactating Mediterranean buffaloes (Bubalus bubalis) ranging in age from 24 months to 14 years. Res. Vet. Sci. 79: 77-80.

Corah, L. 1996.Trace mineral requirement of grazing cattle. Anim. Feed Sci. Technol. 59: 61-70.

Ganong, W.F. 1967. Review of Medical Physiology, 3rd edition, Lange Medical Publication Marusen Co., Ltd, USA.

Gibson, R. 2005. Principles of Nutritional Assessment., Oxford University Press: New York.

Grace, N.D. 1983. The mineral requirements of grazing ruminants. (Occasional Publication No. 9): New Zealand Society of Animal Production.

Henderson, D.C. 1990. The Veterinary Book for Sheep Farmers. Farming Press Books, UK.

Mc Dowell, L.R., J.H. Conrad, G.L. Ellis and J.K. Losli. 1983. “Minerals for Grazing Ruminants in Tropical Regions” bull, Univ. Fl. Coop. Ext. Serv. Univ. of Florida, Gainesville, Florida.

Mcdowell, L.R. and J.D. Arthington. 2005. Minerals for Grazing Ruminants in Tropical Regions. Extension Bulletin, Anim. Sci. Dept., Univ. Florida, USA.

Nathan, D.G., and OSKI'S. 2003. Nathan and Oski's Hematology of Infancy and Childhood. 6th ed, 1, Philadelphia: WB Saunder's Company. 1010.

Noaman, V. 2013. Assessment of Some Serum Trace Element in Holstein Dairy Cattle on Industrial Farms of Isfahan Province, Iran. World Appl. Sci. J. 21.8.96.

Raven, A.M. and A. Thompson. 1959. The availability of iron in certain grasses, clover and herb species. I. Perennial ryegrass, cocksfoot and timothy. J. Agric. Sci. 52: 177-186.

Richard, L.A. 1968. Diagnosis and improvements of saline and alkaline Soils. 1st Ed. Agri. Handbook No. 60, IBH Publishing Co., New Delhi, India.

Saleem, R., R. Iqbal, M.N. Abbas, A. Zahra, J. Iqbal and M.S. Ansari. 2014. Effects of Tramadol on Histopathological and Biochemical Parameters in Mice (Mus musculus) Model. G. J. Pharmacol. 8: 14-19.

Samanta A. and G. Samanta. 2002. Indian J. Anim. Nutr. 19: 278-281.

Shabir, N., R. Iqbal and M.N. Abbas. 2014. Effect of Propofol on Haemodynamics and Blood Profile of Human. World Journal of Medical Sciences. In Press. Yadav, P.S., A.B. Mandal, V.K. Kapoor, K.R. Sunaria, and N.S. Maan, 1998. Indian J. Anim. Sci. 68: 1059-1061.